

Use of Formal Decision-Making Methods for USACE Projects

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Acknowledge:

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Decision-Making Methods

- **Are used to guide business, legal & engineering practices**
- **Minimize confusion, complication & contention - foster cooperation**
- **Provide a 'framework' - not necessarily a rigid decision**
- **'Drop ins' to spreadsheet software**

Multiattribute Utility Analysis (MAUA)

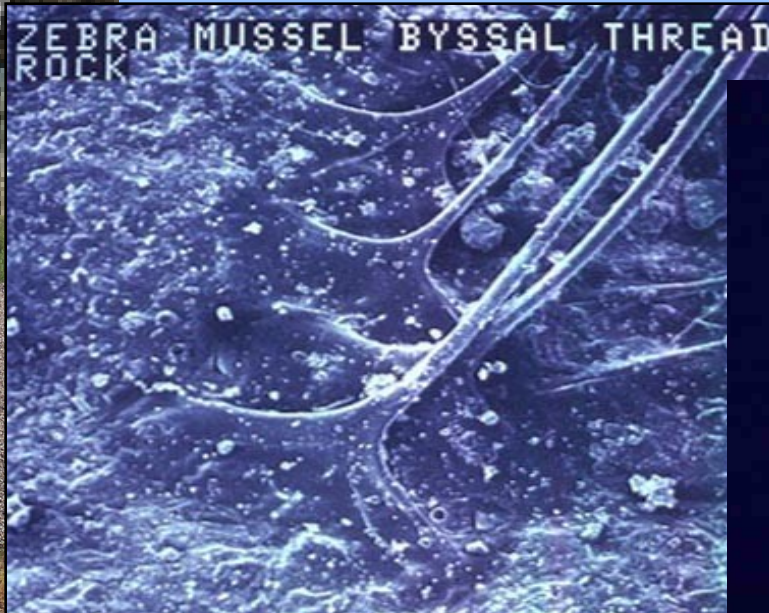
- **Identify decision objectives**
- **Establish attributes & rating scales**
- **Assign weights to specify relative importance of objectives**
- **Combine weights & ratings to obtain overall desirability measure for each option**

Projects

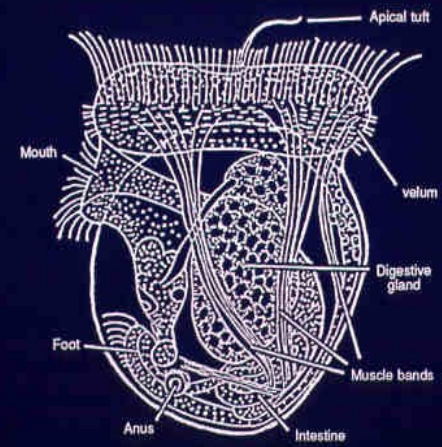
- **Zebra mussel entry associated with irrigation**
- **Choosing sites for ecosystem restoration: Apalachicola River, FL**
- **Endangered species relocation (*Potamilus capax*)**
- **Translocating freshwater mussels for a dredging project**

Zebra Mussels (*Dreissena polymorpha*)

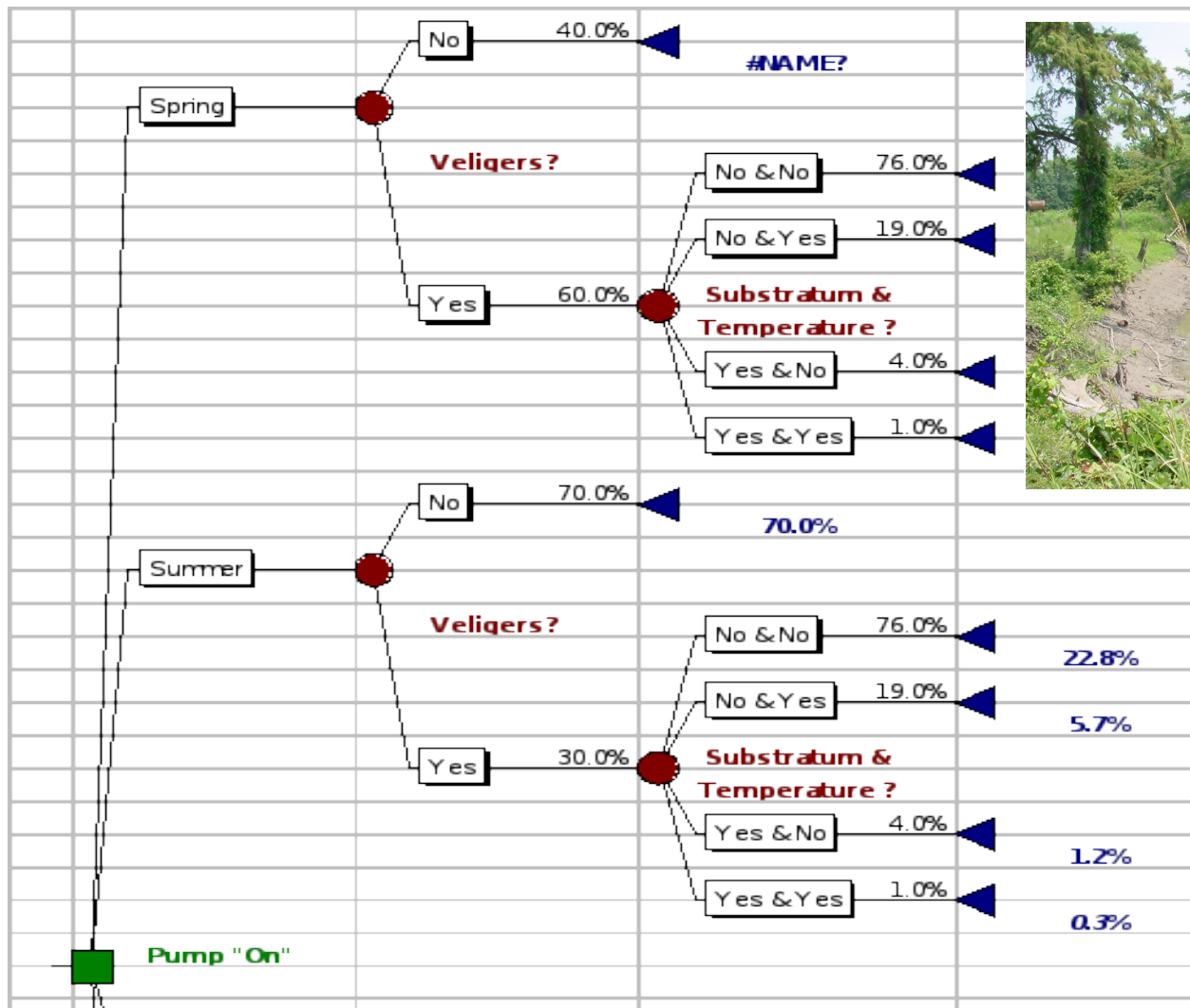
- Thin-shelled, short-lived, tolerate extreme crowding
- Intolerant of desiccation & temperature $> 31^{\circ}\text{C}$
- Typically attach to hard substratum in lakes & large, impounded rivers



ZEBRA MUSSEL VELIGER



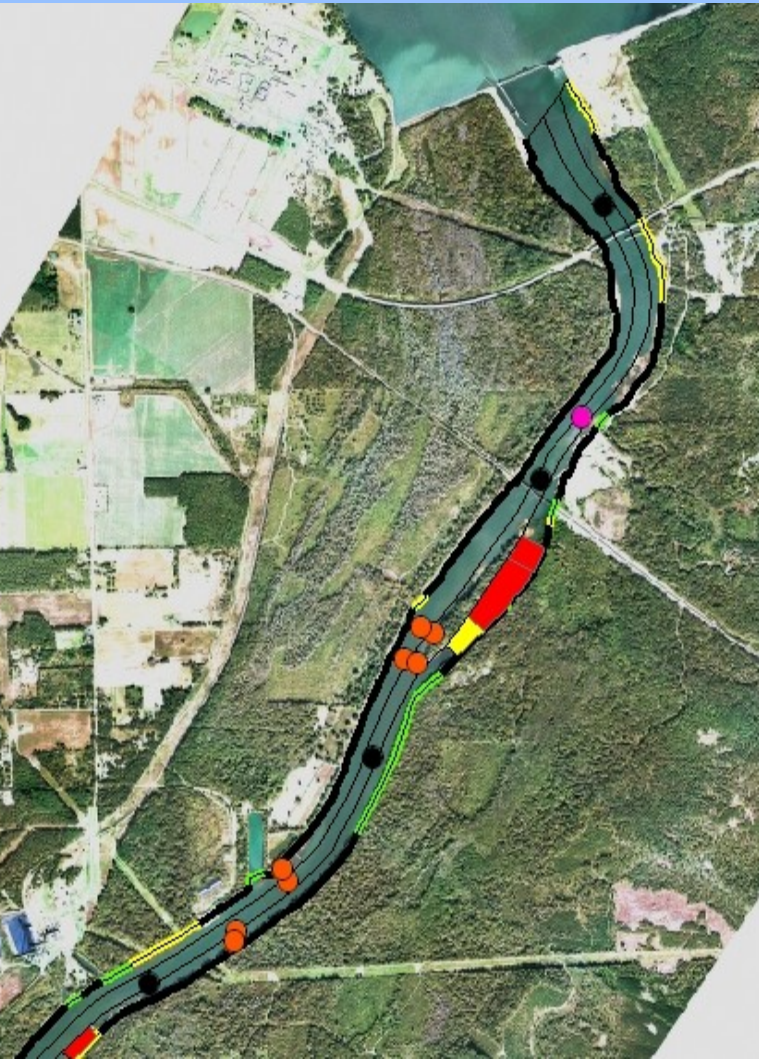
How can we minimize zebra mussel entry into Bayou Meto, AR ?



Pump-irrigation Project

Slough Restoration Project - Apalachicola River

Improve connectivity between river & selected sloughs

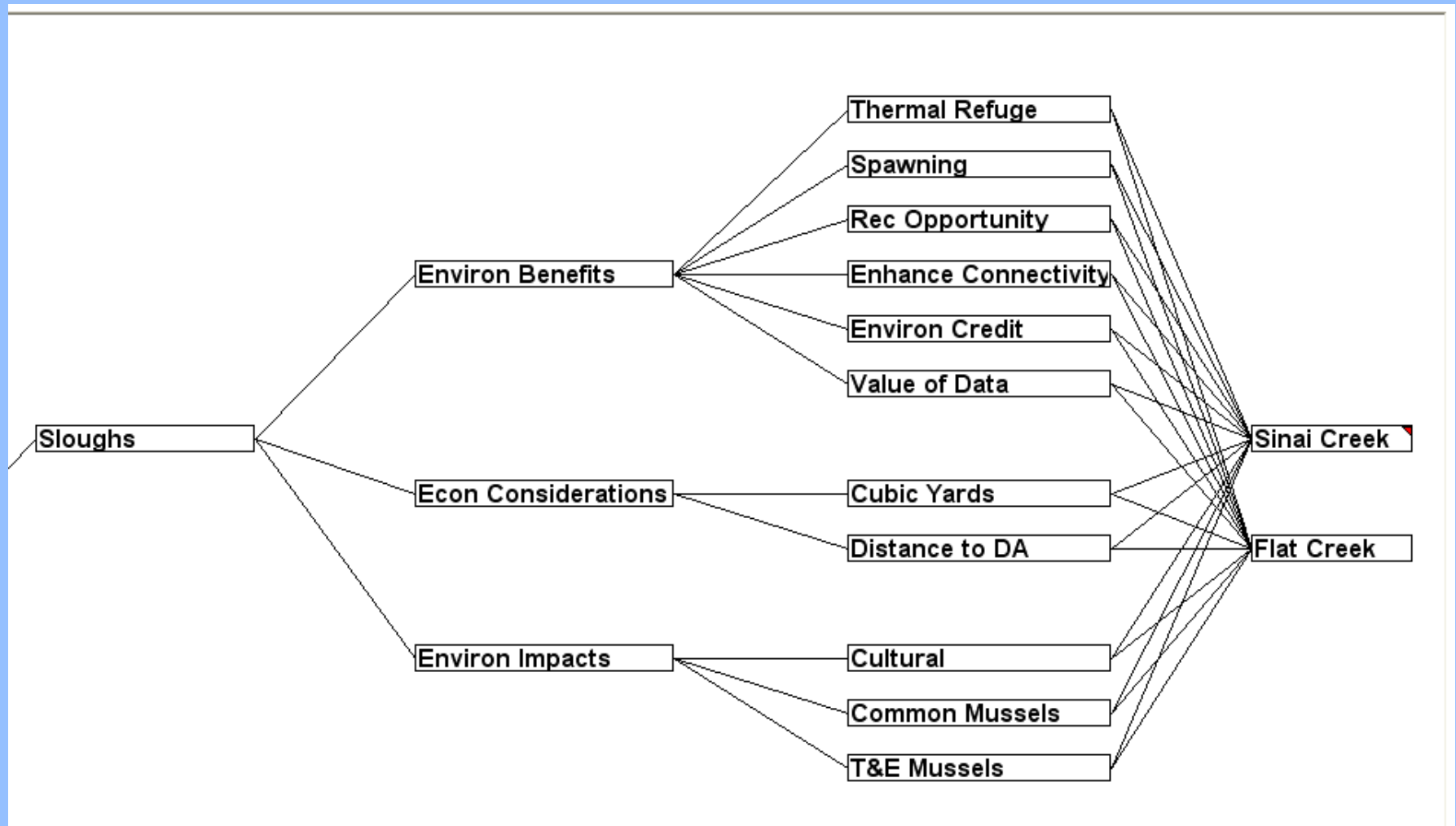


Mussels of concern:
Fat threeridge (E)
Purple bank climber

Fish of concern:
Gulf sturgeon (T)

Battle Bend Slough
(1 of 19 potential sloughs)

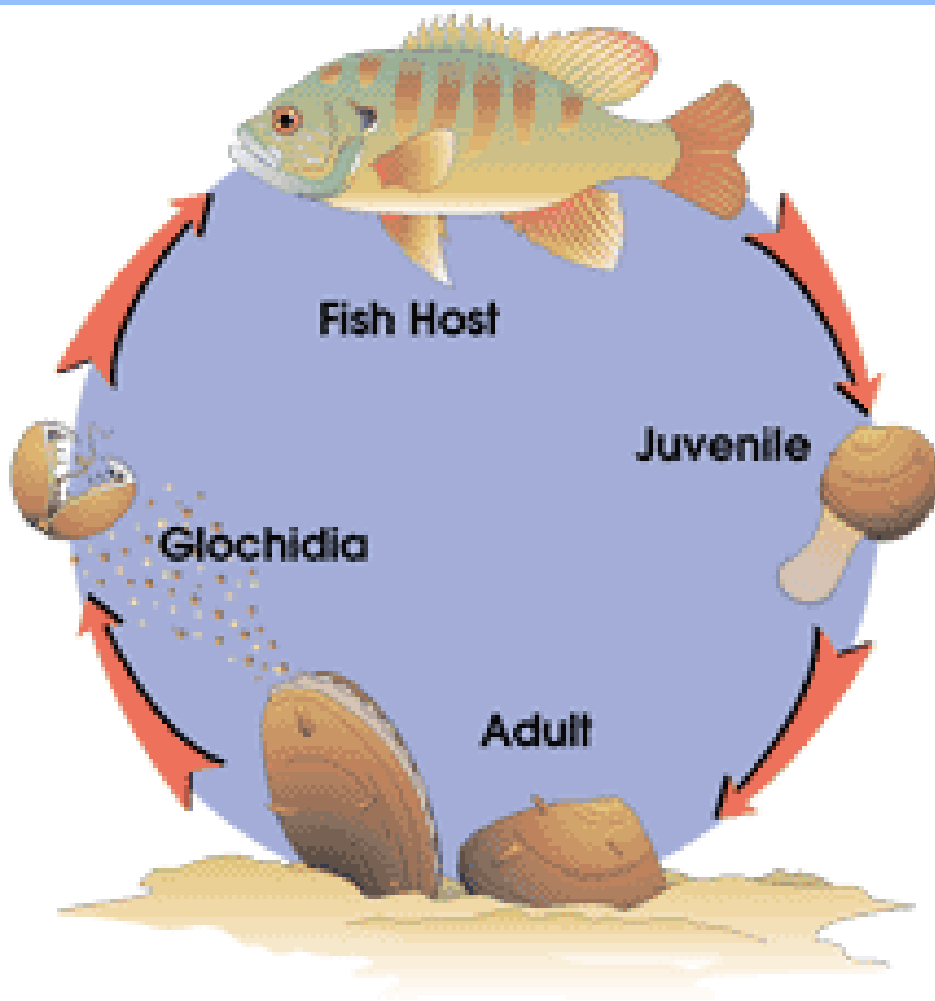
Which sloughs in the Apalachicola River should be restored?



Freshwater Mussels—Family Unionida

Thick-shelled, long-lived

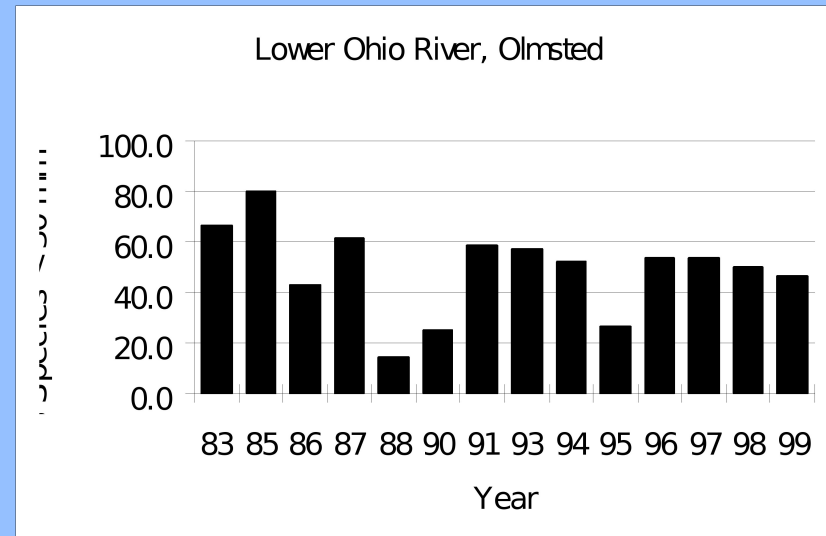
Partially buried in sand-gravel substratum in rivers



297 native mussel species in US

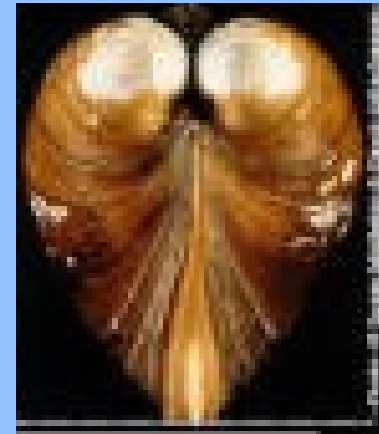
- 71% T, E, or of special concern
- 5 % Undetermined status
- 24% Stable

Williams et al. (1993)

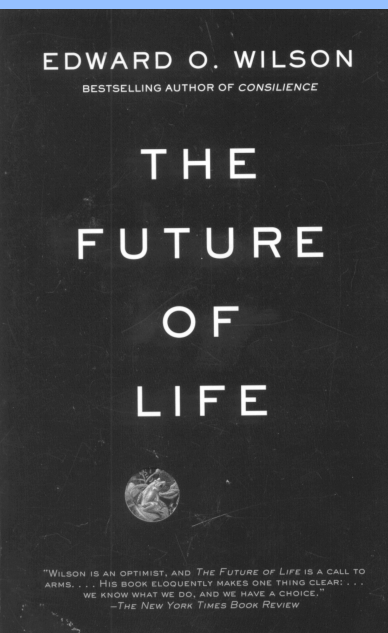
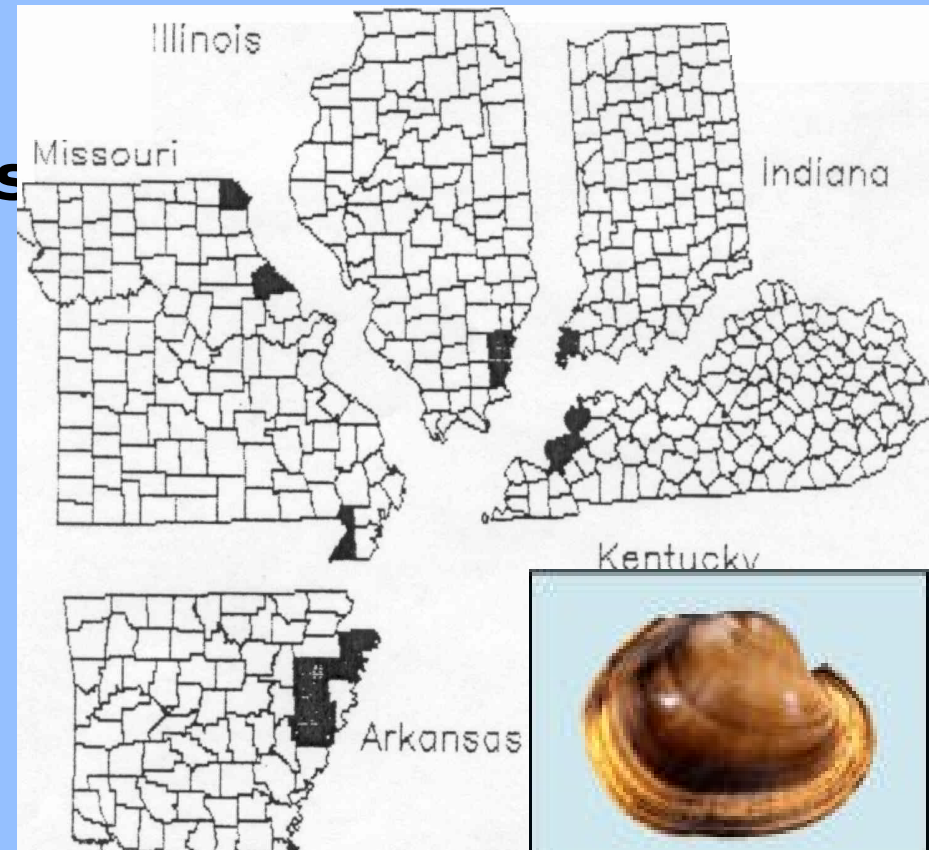


Potamilus capax

(Fat Pocketbook Mussel)

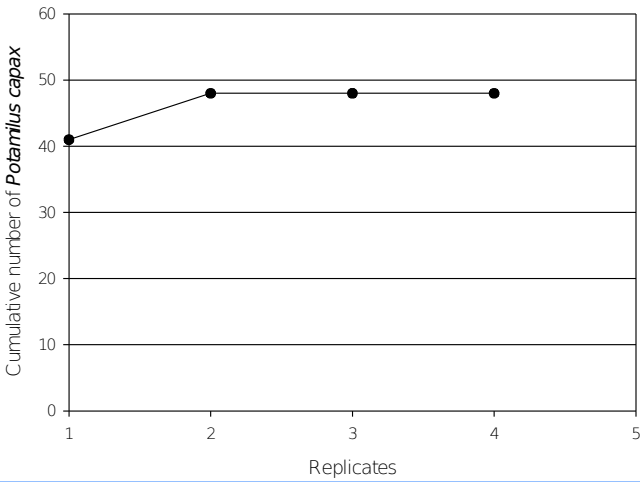


- Thought to be extinct in 1970s
- Listed as Endangered in 1976
- Typical habitat:
Fined-grained silt, low velocity sloughs
- Structure:
Extremely inflated, thin s

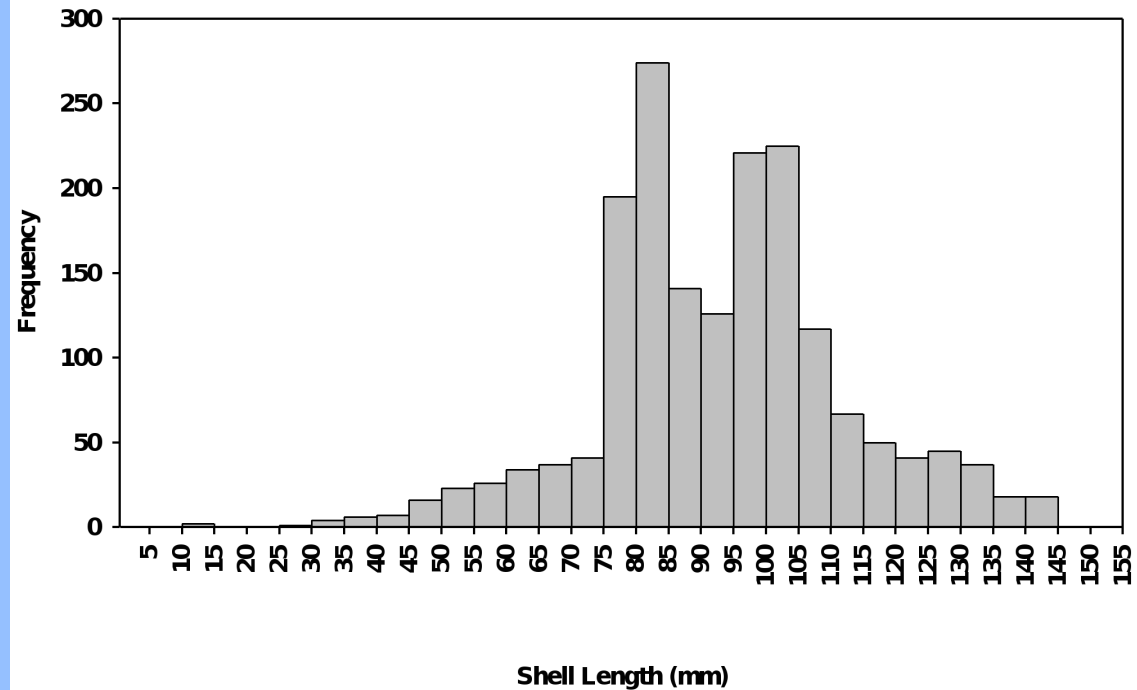
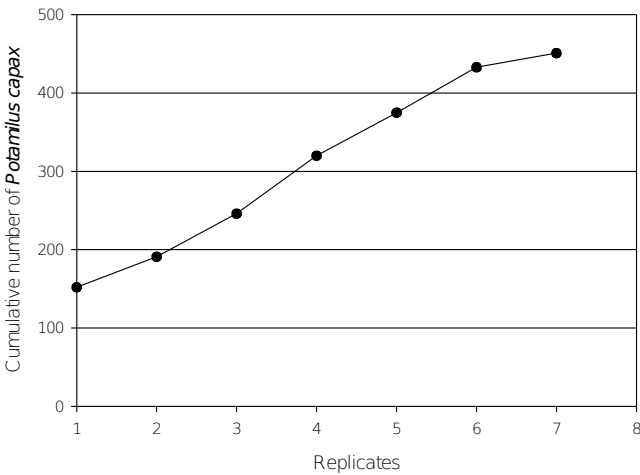


Stateline Outlet Ditch, AR

Reach 2



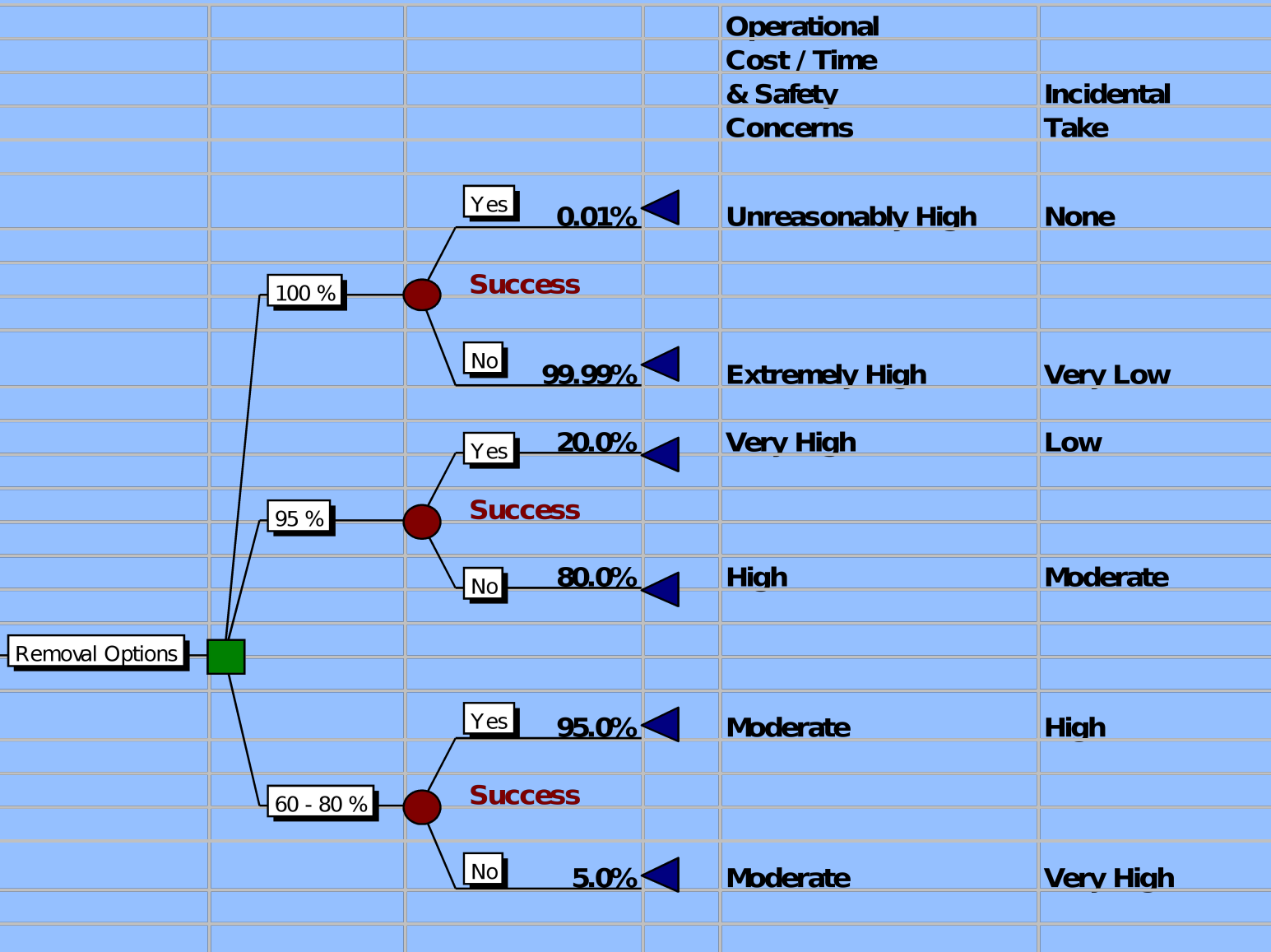
Reach 13



Relocation of *P. capax*

- **How many mussels should be moved?**
 - **1) All 2) 95% 3) 60-80%**
- **How many mussels should be marked & measured?**
 - **1) All 2) Subset 3) None**
- **Where should mussels be placed?**
 - **1) St. Francis River 2) Ditch 29**

How many mussels should be moved?



How many mussels should be marked & mea

Alternatives		Consequences			
		Mussel Mortality	Impaired Relocation Efficiency	Actual Cost	Scientific Value
Treatment	All	Low	Moderate	Moderate	Moderate
	Subset	Very Low	Low	Low	Moderate
	None	None	None	None	None

How do we move ~ 1 million freshwater mussel

The Problem:

4.3 acres = 17,410 m²

~ 66 mussels / m²

Surface area, open bucket - 3.7 m²

Area penetrated by sides of bucket - 0.4 m²

Mortality:

Directly being hit by the dredge

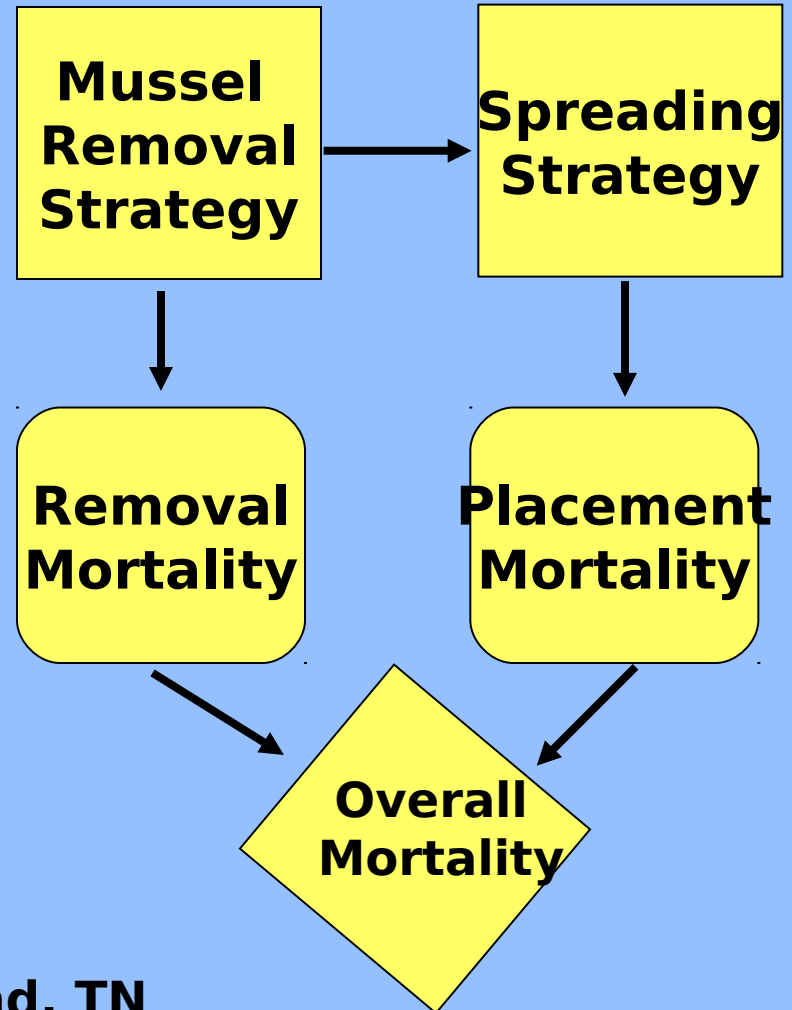
Burial during sediment placement



Minimize Dredging Impacts on Freshwater M



Estimating mussel mortality from dredging & disposal



Tennessee River near Diamond Island, TN

Benefits of Decision Methods

- **Formal decision tools clarify environmental issues**
- **Reduce data acquisition needs**
- **Promising areas:**
 - **Invasive & endangered species**
 - **Habitat restoration**
 - **Environmental assessment**